

CLAIMS

What is claimed is:

1. A method for inspecting a substrate, the method comprising:
5 exposing the substrate to an incident beam;
inducing relative motion between the incident beam and the substrate such that
the beam travels over a surface of the substrate along a substantially
spiral shaped path; and
detecting charged particles emitted from the substrate.
10
2. The method of claim 1, wherein the relative motion is caused, at least in part,
by motor elements located outside a vacuum chamber.
3. The method of claim 1 further comprising:
15 controlling charge at a surface of the substrate by illuminating the surface with
electrons having a low landing energy.
4. The method of claim 3, wherein the low landing-energy electrons are provided
concurrently with the incident beam.
20
5. The method of claim 3, wherein the low landing-energy electrons are provided
in an alternating fashion relative to the incident beam.
6. A method for inspecting a substrate, the method comprising:
25 exposing the substrate to an incident beam of charged particles using a
column, said beam causing charged particles to be emitted from the
substrate; and
detecting the emitted charged particles using multiple detector elements,
wherein the multiple detector elements are positioned outside the column.
30
7. The method of claim 6 further comprising:

11.1110(P0979)

filtering the emitted charged particles such that those emitted charged particles that are detected consist essentially of backscattered electrons.

5 8. The method of claim 6, wherein at least some of the detectors are positioned around a periphery of the substrate.

9. The method of claim 6 further comprising:
controlling charge at a surface of the substrate by illuminating the surface with electrons having a low landing energy.

10

10. A method for inspecting a substantially flat substrate, the method comprising:
exposing the substrate with an incident beam of charged particles using a column, said incident beam causing charged particles to be emitted from the substrate;

15 detecting the emitted charged particles using multiple detector elements; and
processing a signal derived from the multiple detector elements to be relatively sensitive to topological contrast and relatively insensitive to material contrast.

20 11. The method of claim 10, wherein the signal is processed to distinguish between pits and particles present on the surface.

12. An apparatus for inspecting a substrate, the apparatus comprising:
a column for exposing the substrate to an incident beam;
25 a spiral motion mechanism for inducing relative motion between the incident beam and the substrate such that the beam travels over a surface of the substrate along a substantially spiral shaped path; and
at least one detector for detecting charged particles emitted from the substrate.

30 13. An apparatus for inspecting a substrate, the apparatus comprising:

11.1110(P0979)

a column for exposing the substrate to an incident beam of charged particles,
said beam causing charged particles to be emitted from the substrate;
and

multiple detector elements for detecting the emitted charged particles,

5 wherein the multiple detector elements are positioned outside the column.

14. An apparatus for inspecting a substrate, the apparatus comprising:

a column for exposing the substrate with an incident beam of charged particles,
said incident beam causing charged particles to be emitted from the
10 substrate;

multiple detector elements for detecting the emitted charged particles; and

a signal processor adapted to process a signal derived from the multiple
detector elements to be relatively sensitive to topological contrast and
relatively insensitive to material contrast.

15